Patent claims

1. A method for operating a supply unit for a driver circuit (3) in a power stage (4), particularly in a power electronic circuit (3) for an electric motor (2),
where a control current through an inductive converter (11) is switched using a first and a second switch (14, 15) in order to generate a power supply for the power stage,
where turning off the first switch (14) allows a free-wheeling current to flow through a free-wheeling current path (16),
having the following steps:
a) first and second switches (14, 15) are turned on;
b) the first switch (14) is turned off in a turn-off operation;
c) the free-wheeling current through the first free-wheeling current path (16) is measured;
d) the switching behavior of the second switch (15) is controlled on the basis of the measured first free-wheeling current.

2. The method as claimed in claim 1, where the second switch (15) is prevented from being turned off if measurement of the free-wheeling current for the first free-wheeling current path (16) detects a fault.

3. The method as claimed in claim 1, where the first and second switches (14, 15) are prevented from being turned on again if measurement of the free-wheeling current (16) through the first free-wheeling current path detects a fault.

4. The method as claimed in one of claims 1 to 3, where the fault is detected if the first free-wheeling current

is below a respective prescribed threshold current.

5. The method as claimed in one of claims 1 to 4, where turning off the second switch (15) allows a free-wheeling current to flow through a second free-wheeling current path (17), having the following further steps:

e) the first and second switches (14, 15) are turned on;

f) the second switch (15) is turned off in a further turn-off operation;

g) a free-wheeling current through the second free-wheeling current path (17) is measured;

h) the switching behavior of the first switch (14) is controlled on the basis of the measured free-wheeling current through the second free-wheeling current path (17).

6. The method as claimed in claim 5, where the first switch (14) is prevented from being turned off if measurement of the free-wheeling current through the second free-wheeling current path (17) detects a fault.

7. The method as claimed in claim 5, where the first and second switches (14, 15) are prevented from being turned on again if measurement of the free-wheeling current through the second free-wheeling current path (17) detects a fault.

8. The method as claimed in one of claims 1 to 7, where the switches (14, 15) are actuated by a first or second control signal, with the first and/or second control signal being generated using a periodic signal.

9. The method as claimed in claim 8, where the periodic signal is blocked for generating the first and/or second

control signal if measurement of the free-wheeling current through the first and/or the second free-wheeling current path (16, 17) detects a fault.

10. The method as claimed in either of claims 6 and 7, where the fault is detected if the free-wheeling current through the second free-wheeling current path (17) is below a respective prescribed threshold current.

11. A supply unit (6) for operating a driver circuit (3) for a power stage (4) with a power supply, particularly in a power electronics circuit (3) for an electric motor (2),
having an inductive converter (11) in order to generate the power supply for the power stage (4),
having a first and a second switch (14, 15) which are connected in series with the inductive converter (11), with the power supply in the inductive converter (11) being able to be produced by turning on and off the first and second switches (14, 15),
having a first free-wheeling current path (16) connected to the first switch (14) in order to accept a free-wheeling current in a turn-off operation for the first switch (14),
where the control device is designed so that, in a turn-on operation, it turns on the first and second switches (14, 15) and, in a turn-off operation, it first of all turns off the first switch (14) and measures a free-wheeling current through the first free-wheeling current path (16), and switches the second switch (15) on the basis of the measured free-wheeling current.

12. The supply unit (6) as claimed in claim 11, where a second free-wheeling current path is connected to the second switch in order to accept a free-wheeling current

in a turn-off operation for the second switch, where the control device is furthermore designed so that, in a further turn-off operation, it first of all turns off the second switch (15) and measures a free-wheeling current through the second free-wheeling current path (17), and switches the first switch (14) on the basis of the measured free-wheeling current.

13. The supply unit (6) as claimed in claim 12, where the first free-wheeling current path has a first current sensor (20) and/or a first free-wheeling diode (18), and/or where the second free-wheeling current path (17) has a second current sensor (21) and/or a second free-wheeling diode (19).

14. The supply unit (6) as claimed in claim 13,
where the control device comprises a first control circuit (22) and a second control circuit (23), which is separate from the latter,
where the first control circuit (22) controls the switching of the first switch (14) and measures the current through the first free-wheeling current path (16),
where the second control circuit (23) controls the switching of the second switch (15) and measures the current through the second free-wheeling path (17),
and where the first control circuit (22) and the second control circuit (23) are coupled to one another such that the first control circuit (22) switches the first switch on the basis of a second Active signal which is applied by the second control circuit (23),
and that the second control circuit (23) switches the second switch on the basis of the first Active signal which is applied by the first control circuit.

15. The supply unit (6) as claimed in one of claims 10 to 12, where the first control circuit (22) and/or the second control circuit (23) do not generate a respective first or second Active signal in the event of a malfunction.

16. The supply unit (6) as claimed in claim 14 or 15, where the first and second Active signals are a respective periodic signal which is generated by the first or second control circuit (22, 23).

17. The supply unit (6) as claimed in one of claims 14 to 16, where the first and second control circuits (22, 23) are respectively designed to prevent the switching of the first or second switch (14, 15) if measurement of the free-wheeling current through the first and/or the second free-wheeling current path (16, 17) detects a fault.

18. The supply unit (6) as claimed in claim 17, where the fault can be detected if at least one of the free-wheeling currents is below a respective prescribed threshold current.

19. The supply unit (6) as claimed in one of claims 11 to 18, where the inductive converter (11) comprises a transformer.

20. The supply unit (6) as claimed in either of claims 17 and 18, where the switch can be actuated by a first or a second control signal, where the control device is designed to generate the first and/or the second control signal using a provided clock signal, with the clock signal being interrupted if a fault occurs, which means that the generation of the first and second control signals is interrupted.